



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

TRANSACTIONS  
OF THE  
ETHNOLOGICAL SOCIETY OF LONDON.

---

I.—*On the Supposed Stone, Bronze, and Iron Ages of Society.*  
By JOHN CRAWFURD, ESQ., F.R.S.

[*Read May 10th, 1864.*]

THE theory which supposes three different ages of civilisation, marked respectively by the use of arms and implements of stone, of bronze, and of iron, seems to have originated in the discoveries recently made by the examination of the refuse heaps of Denmark and the pile buildings of the Swiss lakes. As respects Denmark and Switzerland, and most probably several other parts of Western Europe in which the advance of civilisation was very slow, there can be little doubt but that the three ages above indicated did really exist; but if the order of progress indicated by them be applied, as a general rule, to all mankind, we shall soon find the theory refuted by the stubborn facts of history.

Man, created naked, houseless, and even speechless, but with a brain to invent, hands and tongue to execute, and necessity to stimulate him, has been enabled to surmount the seeming difficulties of his position. In his progress towards civilisation, his advance has always been in proportion to the opportunities presented to him, and to the capacity of the race to which he happened to belong. In so far as his progress is indicated by arms and tools, it appears to me that it may be divided into three periods. On man's first appearance, the most obvious materials would consist of wood or bone; and to this early time would probably belong the invention of fire. This would constitute the wood and bone age, of which, from the perishable nature of the materials, we can, of course, possess but slender records. This would be followed by the period in which tools and weapons were fabricated from stone, accompanied by the discovery of the art of fabricating utensils of clay fashioned by the hand. Such, however, might not always be the case, for the South Sea

islanders, who had invented stone arms and tools, and who were very far from being abject savages, were unacquainted with pottery, and in their ignorance of any vessel capable of producing boiling water, scalded their fingers at the tea-urn of Captain Wallis. This would constitute the second age, and the third (a great stride) would consist of that in which metals were substituted for stone. This might be called the metallic period. The metal which in this case would be first employed, would, according as circumstances were more or less favourable to the one or the other, be iron or copper—the only ones of sufficient hardness and ductility to make cutting implements. Bronze, of far more difficult production than either, would necessarily be a more recent invention.

Dr. Percy, in his great work on metallurgy, thinks that iron preceded all other metals, and thus expresses himself: "From suitable ore, of which abundant and readily accessible supplies occur in various localities, nothing more easy can be conceived than the extraction of malleable iron. Of all metallurgical processes, it may be regarded as amongst the most simple. Thus, if a lump of red or brown hæmatite (oxide of iron) be heated for a few hours in a charcoal fire, well surrounded by, or imbedded in, the fuel, it will be more or less completely reduced, so as to admit of being easily forged, at a red heat, into a bar of iron. The primitive method of extracting good malleable iron directly from the ore, which is still practised in India and in Africa, requires a degree of skill very far inferior to that which is implied in the manufacture of bronze. The production of this alloy involves a knowledge of copper-smelting, of tin-smelting, and of the art of moulding and casting. From metallurgical considerations, therefore, it is reasonable to suppose that the so-called age of iron would have preceded the age of bronze. Archæologists, however, seem generally to have arrived at an opposite conclusion, mainly from the fact that, while ancient objects of iron are exceedingly rare, ancient objects of bronze are abundant. But it should be remembered that iron is very rapidly corroded by oxidation, even in dry climates, whereas bronze is very slowly acted on, even in moist climates. Hence, if objects of iron were ever so numerous in ancient times, it is certain that only few could have been long preserved, as the conditions necessary to protect the metal from oxidation must have been quite exceptional."

On mere metallurgical considerations, there can surely be no question but that iron would have priority over copper and bronze; yet there are conditions under which this order has certainly been reversed, although they are exceptional. A people, as I shall endeavour to show in the course of this paper, must have attained a considerable measure of civilisation before they

had invented iron, however simple the process, and had forged tools and cutting implements of it, in substitution of stone implements. Even if malleable iron preceded copper and bronze, as most probably it did in most cases, it is certain that cutting instruments of the latter would be preferred down to the discovery of the art of fabricating steel, apparently not a very early one, for in some of the battles of the Romans with the Gauls, the swords of the latter are described as bending in action, and not having the quality of regaining their proper form, a fact which would imply that they were made of soft iron, or that the Gauls were not at the time possessed of the art of making hard iron or steel.

I shall now endeavour to give an outline of the introduction of metallic tools, implements, and arms, so far as I have been able to collect authentic materials for it. Iron was totally unknown to all the aboriginal inhabitants of America, and copper and bronze were known to but a small number of its more civilised nations. Their arms and tools were of wood, bone, and stone. The same was the case, not only with the savages of Australia and New Guinea, but with the more civilised inhabitants of the innumerable islands of the North and South Pacific Ocean, all of whom, since their discovery, have received iron with avidity, whenever they had the opportunity. Even the savages of the Andaman Islands, who had previously made their arrow-heads of stone, now make them of iron, availing themselves of the iron of wrecked European shipping. None of these rude people have themselves attempted to reduce iron from its ores, and of course, not the more difficult one of reducing the ores of copper and tin for the production of bronze. They receive the metals from strangers, as most probably did the rude forefathers of the civilised nations of Europe.

The rudest people possessed of the art of reducing the ores of iron to the metallic state are certain Negro tribes of Africa, and the least advanced inhabitants of the Malay Archipelago, as in the example of the Dayaks of Borneo. I have no new facts to communicate respecting the first of these people, and shall, therefore, confine my observations to the last. Several of the rude tribes of the interior of Borneo—unlettered savages, whose glory it is to waylay travellers and decapitate them, storing their heads as trophies—possess the art of manufacturing malleable iron and good steel. The process followed by them is nearly the same very simple one as that of the Hindus. The ores employed are always hæmatites or the purest oxides, and the fuel always charcoal. But in so far as philological evidence can be trusted, the invention of iron is not their own, but acquired from the Malays and Javanese—people tolerably civilised, indicated by a respectable knowledge of

agriculture and the useful arts, with written language. While the languages of the savages of Borneo are different from those of these two civilised nations, nearly all the terms connected with such arts as they possess are taken from the Malay and Javanese; and among these the terms connected with the fabrication of iron, and the forging of tools and weapons from it, are taken from the Malay or Japanese languages, which, although differing essentially from each other, agree for the most part in this respect. Thus, the names for the furnace and the bellows, for iron and for steel, for the anvil, the hammer, the tongs, the file, the chisel, and the knife, the dagger and the sword, are all taken from the Malay and Javanese languages.

The use of these words of the dominant languages of Sumatra and Java as connected with the invention and use of iron, is very general over the whole Malay islands, but to a considerable degree extends even to the remote Philippines. From all this, I think it must be inferred that the invention of iron was made by the civilised people of Sumatra and Java, the ruder nations being only imitators. The invention most probably originated in the first of these, which more abounds in available ore than volcanic Java. In the beginning of the sixteenth century, however, Java was the principal place of manufacture for tools and weapons, although probably the unwrought iron was imported from Sumatra. The tools and weapons, for instance, used by the Malays of Malacca at the time in question, we find, on the authority of the intelligent and faithful traveller Barbosa, were imported from Java.

All the metals which are native products of the Malayan countries are known by native names. These are confined to iron, steel, tin, and gold. Silver, copper and quicksilver are known only by foreign ones, the two last being taken from the Sanskrit. No mines of any of the three are ever known to have been wrought within the Archipelago, and they must consequently have been received from strangers, and these strangers were Hindus, the only people that in remote times are authentically ascertained to have held intercourse with the Malayan nations. Bronze or bell-metal has been long known to the Javanese, and largely used in the manufacture of musical instruments of percussion—the well-known gong, immemorially a considerable article of exportation to other islands of the Archipelago. The name for bronze in the Malayan languages is taken from the Sanskrit, and as the copper also must have come from India, we may conclude that the manufacture of bronze was introduced by the Hindus. This is, indeed, in a good measure proved by our finding among the ancient ruins of Java a great many relics of this alloy, consisting of Hindu images, bells, and sacrificial cups, the latter bearing dates which carry us back for five centuries.

Among these relics, I am not aware that a single tool or cutting instrument of bronze has ever been discovered. Neither have there been of those of copper, although plates of this metal, with ancient inscriptions, have been not unfrequent among the same ruins. It may, then, be safely concluded that tools and cutting instruments of bronze never existed among the people of the Malayan islands. The early inventions of iron and steel precluded the necessity for them ; and here, therefore, at all events, a bronze age seems never to have existed.

America presents a case in which an age of bronze preceded one of iron ; but even the bronze age itself was here preceded by one of copper. The case was, however, exceptional, and arose out of a peculiarity in the geological formation of a part of the American continent—the existence in the state of Michigan, and about the shores of Lake Superior, of extensive formations of copper in the metallic state. The ancient inhabitants had mined it, and tools and implements made from it have been discovered in the mound structures of the Ohio and Mississippi. This metallic copper, in the course of a rude traffic, found its way as far as Mexico and Peru ; the civilised people of these regions adding to it a little tin, which is a native product of Peru, and of comparatively easy reduction from its ores, produced bronze, of which the tools and cutting instruments of the Mexicans and Peruvians were composed. No people of America had, as is well known, invented iron. Perhaps the more civilised nations may have rested satisfied with copper and bronze, both superior as cutting instruments to iron before the discovery of steel ; and none of the savage nations had attained that measure of civilisation which seems everywhere to be indispensable to the first discovery of iron. In the case of America, then, there can be no question but that an age of bronze preceded that of iron, while that of bronze was itself preceded by one of copper.

Ancient Egypt seems to offer a case in which a bronze age clearly preceded an iron one, or, at least, in which cutting instruments of bronze preceded those of iron. In all the more ancient monuments of that country, while abundant tools, implements, and arms of bronze have been found, no authentic example of them in iron is recorded. We are not at liberty, however, to argue from this that iron was unknown when the ancient monuments in question were built. Suitable ores of iron for smelting were evidently rare in Egypt, for Sir Gardner Wilkinson, the most skilful and experienced of all our Egyptologists, was able to discover no more than a single ancient iron mine in all Egypt. From this it may be inferred that iron would be a scarce commodity ; and, if the art of hard-casing it or converting it into steel had not been discovered, of course it would follow that bronze for cutting instru-

ments would precede it. After the Greek and Roman conquests, iron, which was the material at the time of the tools and cutting instruments of these people, would necessarily become more common. Even then, however, cutting instruments of a metal so liable to decomposition, even in the dry air of Egypt, where heavy dews prevail, would not be preferred for deposit in tombs. We are not, however, without at least one example of iron in an Egyptian tomb. The late Mr. Rhind, a most diligent and careful observer, discovered, in an unrifled tomb, hasps and nails of iron which he describes as being "as lustrous and pliant as the day they left the forge." A bi-literal inscription showed that the bodies interred in this tomb died in the twentieth year of the reign of Augustus. Even in this comparatively recent time in Egyptian history the metal was mere soft iron, and we have no example of the deposit of cutting instruments made of case-hardened iron or steel.

The relation of the metals in point of precedence, seems to be very strikingly illustrated by their condition in Japan, and the best authority on the subject is the diligent and trustworthy Kämpfer, who visited that empire at the close of the seventeenth century (1690), about a hundred and fifty years after its discovery. Here is his account of the metals of that country :—"Copper is the most common of all metals dug up in Japan, and the produce of copper mines enriches several provinces. Brass is very scarce in Japan, and much dearer than copper, the calamine stone being imported from Tonquin in flat cakes, and sold at a very good price. Iron is much of a price with copper, iron tools being full as dear or rather dearer than those of copper or brass. Such household goods as hooks, cramps in buildings and ships, with such other instruments as are in other countries made of iron, are made in Japan of copper or brass. They do not dress their victuals in brass pans, but have a particular sort of kettles or pans, which are made of a composition of iron, and are pretty thin. The old ones of this sort are very much esteemed, and bought at a great rate, they having somewhat particular in their shape, and which make, at present, they have lost the art to imitate. The province of Bongo affords a small quantity of tin, so exceedingly fine that it almost comes up to silver. There is but little use made of this metal in the country."

Such is Kämpfer's account, written a hundred and seventy-four years ago ; and I do not believe there is at present much difference, for in looking into a price current of Yokohama, at present the principal port of our trade, I find a large exportation of copper as in the olden time, while there is no importation of European iron, such as there is into India and China. It may be inferred, therefore, that the relative value of copper and iron do not

materially differ at the present day from what they were in the time of Kæmpfer, the cheapness of copper, its long use, and its intrinsic superiority for many purposes giving it still a preference even when the cheaper metal presents itself.

From this statement it will appear that a bronze age never existed in Japan. Indeed, bronze or an alloy of copper with tin, is not named at all by Kæmpfer. No doubt, however, the Japanese are acquainted with bronze for the fabrication of bells, gongs, and the like. Indeed, tin from the Malay islands has long been imported into Japan in moderate quantities, most probably for the purpose of making this very alloy; and I see that our own merchants are now importing it, the quotation of price being 20 per cent. higher than that of the same article, at the same time at the emporium of Singapore. It deserves further to be observed as illustrative of the abundance and cheapness of copper in Japan, and the scarcity and high price of tin, that the last is dearer than the first by one-fourth part, thus reversing the proportion which holds good in Europe.

According to the statement now made, the ages of man or the stages of his social progress as measured by the materials of his tools and weapons, in so far as Japan is concerned, would consist of a wood and bone age, a stone age, and a copper age, while there would be neither an age of bronze or of iron.

I have, however, some observations to offer on the iron of Japan, which, although scarce and dear, appears to have been reduced from its ores with a skill far beyond that of the Chinese. The sword-blades of the Japanese are invariably described as of excellent quality, showing that they were acquainted with steel. They could not use copper vessels for culinary purposes, and had no tin to coat them; they therefore used cooking vessels of cast iron, for it is to these that I have no doubt Kæmpfer alludes. If so, it follows that, like the Chinese, and they only of all Asiatic nations, had the skill to produce furnaces capable of generating such a degree of heat as to reduce the ores of iron at once to the condition of cast iron.

If we look to the condition of the metals among the Phœnicians, the Jews, and the Assyrians—people all of them far in advance of all the nations of Europe three thousand years ago, those of Greece and Italy excepted—we shall find them in possession both of iron, copper, and bronze; but which of them was in most general use it is not easy to determine. That the Jews were early familiar with all of them, and also with tin and lead, is proved by the frequent mention of them in the Pentateuch and other parts of Scripture. The critics admit that the word which in our translation is rendered brass, should be sometimes bronze and sometimes copper. The helmet and the armour of the giant Goliath are described as of brass, in this case probably copper, and the point of his spear



of iron, but no notice is taken of his sword. When David collected materials for the temple which his son and successor was to build, he is said to have "prepared iron in abundance for the nails for the doors of the gates and for the joinings, and brass in abundance without weight"; the last of these probably signifying copper and bronze without weight, from which it might be implied that copper and bronze were more abundant in Judea than iron.

The Tyrians most probably furnished the Jews with all their metals, for they themselves, but mere shepherds, herdsmen, and husbandmen, are not likely to have been skilled in mining and the reduction of metals, not to say that their country is not rich in metallic ores. In the celebrated 27th chapter of Ezekiel we find what were the articles imported and brought into Tyre, with the names of the people, or the quarters, from whence they were imported. Egypt furnished fine linen and embroidered work; the Persians supplied mercenary soldiers; the Sidonians mariners; and Judea corn, honey, and oil. In like manner, Tarshish or Tartessus, considered to have been a Phœnician colony on the southern coast of Spain, furnished silver, iron, tin, and lead, all of them products of Spain, while Javan, believed to refer to the Ionian colonies of Greece in Asia, supplied slaves and brass, a word which if we translate copper, might have been the produce of the Island of Cyprus, close to Ionia, and famed for its abundance of that metal. The metals would be conveyed by a short easy land journey from Tyre to Jerusalem. The Tyrian workmen, alloying tin with copper, would produce bronze, in their hands the obvious molten material of the metallic ornamentalions of the temple of Solomon.

From the discoveries of Mr. Layard, we find that the Assyrians, one of the greatest and most civilised of the nations of ancient Asia, were well acquainted with gold, silver, copper, iron, tin, and bronze. They had tools, vessels, and cutting instruments both of iron, copper, and bronze, but we judge iron to have been the most common from finding it to compose the main part of articles in the fabrication of which the metals are combined, copper or bronze being confined to the inlaid and other ornamental portions. In the Nineveh excavations, objects of bronze are far more frequent than those of iron, but this is obviously owing to the far more rapid decomposition of the latter from oxidation. Mr. Layard discovered in the excavations of Nimrood an iron helmet and the scales or plates of a suit of iron armour, but both in such a state of decomposition through the oxidation of three thousand years that they fell to pieces on being handled, and the fragments only are now preserved in the British Museum.

Iron, then, appears to have been with the Assyrians in more general use than either copper or bronze, although, from its more

rapid decomposition, we have necessarily fewer relics of it. According to Mr. Layard, it was, indeed, an export from Assyria to Egypt.

Iron and steel, although not cast iron, appear to have been known to the Hindus beyond the reach of all record. So have been copper, tin, and bronze. Iron alone is extensively diffused over India. Copper is sparingly produced, and gold, silver, tin, lead, and zinc have always been importations. India, with its advanced civilisation, may be considered as one of the countries in which the art of reducing the ores of iron to the metallic state was first invented. Bronze has also been immemorially known to the Hindus, and has been found in very ancient coins, images, and sacrificial utensils. I am not aware, however, that there is any evidence of its having ever been used in India in the fabrication of tools or cutting instruments, as it was in Egypt, Greece, and Etruria. One of its elements, tin, is not a product of the soil of India, but an import from a comparatively remote country, while at the same time the manufacture of steel is to all appearance of great antiquity. We may safely conclude, then, that with the Hindus, bronze did not precede iron, but, on the contrary, followed it. The probability is, that the inventions both of iron and steel were made in India at several independent points, for I find that not only do the names of these commodities, but of the tools and implements made from them, differ in the different classes of the languages of the country.

The Chinese now possess, and seem for many ages to have possessed, far more metallurgic skill than any other people of Asia, unless we except the Japanese, who seem to be in this respect, at least, their equals. Indeed, it may be said that, in metallurgic skill the Chinese excelled the nations of Europe even down to the middle of the last century, although now so far behind them. They possess and they work mines of gold, silver, copper, quicksilver, lead, and zinc. Down to the middle of the last century they were the only people in the world practically acquainted with zinc, and of its alloy with copper or brass.

With bronze the Chinese have been long familiar, using it for gongs, bells, images, and utensils. This alloy, however, was known in ancient times to Greeks, Romans, and Hindus, as well as to the European nations of the middle ages, having been obtained by the process called "cementation," that is, by smelting a bar of copper in a bed of calamine, or oxide of zinc and carbon. Consulting my friend Mr. Wade, at present her Majesty's Chargé d'Affaires at the Court of Peking, one of the first Chinese scholars and archæologists of our time, I cannot find that there is any evidence of the Chinese having ever used bronze for tools or cutting instruments. This people must, therefore, be set down as one of those among whom the use of iron preceded that of bronze.

As to the races of man in Europe, in so far at least as the more advanced of them are concerned, the use of iron and bronze seems to have been cotemporary, bronze being preferred for cutting instruments, down to the discovery of the art of case-hardening iron, when the last superseded it. In the time of the Homeric poems and of the early Greeks, the sword was of bronze, but as the Greeks advanced in civilisation it was of hard iron.

As to the very rude people who constructed the pile villages of the Swiss lakes, and the yet ruder of Denmark, of whose existence, like that of the savages of Australia, the only record consists in huge heaps of shells, the refuse of their coarse diet, it may be readily conceded that bronze was known to them before iron. But it is impossible to imagine a people in so barbarous and precarious a state of existence to have been the fabricators of their own tools and weapons of such a material, for this would suppose them possessed of the art of reducing the ores of copper, of importing tin, and of smelting, moulding, and casting bronze. It is evident to me that the implements and weapons of bronze which so rude a people possessed must, of necessity, have been supplied by strangers more advanced than themselves. The party furnishing them to the Swiss pile-builders would probably be the Etruscans and other advanced people of Northern Italy, and they would do so much in the same way as the nations of Europe have supplied the savages of America with tools and weapons of iron—that is, in exchange for furs, bees-wax, and other crude native productions.

But from whence came the bronze weapons found in the Scandinavian shell-heaps and peat-bogs? The theory of recent Danish ethnologists and archæologists is that the aboriginal inhabitants of Scandinavia were a small and inferior race of man, dispossessed or exterminated by its present Teutonic inhabitants. The evidence for this consists in a supposed difference in the size and form of the skull of the supposed pristine and present people, and in the shape of the bronze swords discovered, the hilts of which, as is known to be the case with the swords of all Asiatic people, having hilts too small for the large muscular hands of Europeans. The theory considers these bronze swords to have been the weapons of the inferior or dispossessed race. Now the hypothesis appears to me to be open to very valid objections. For instance, history affords no evidence of a race of invaders exterminating the pristine inhabitants of a country. When, indeed, the invaders belong to a superior race, and are of superior civilisation, the savage inhabitants will gradually disappear before them; but this is the work of long time, and in some degree of amalgamation. In the case supposed there is no evidence of superior civilisation on the part of the Teutonic invaders; and indeed the contrary might be inferred, when the bronze swords are ascribed to the conquered

party, no other weapons than those of hard stone being left to the conquerors. Then, as the pristine people supposed by the theory to have been destroyed would not be so at once by a general massacre, but very slowly, the remains of the two imagined races must have mixed in nearly the same stratum of peat or drift, and then would come the ever-recurring difficulty, or more justly the impossibility, of distinguishing the skulls of races which, however widely different in psychical character when the living form is considered, yet very closely approximate each other in some important parts, as in the example of the skulls of Hindus, Arabs, and Europeans, which no man can pretend to distinguish.

As, then, it is most improbable that the rude inhabitants of Scandinavia should have possessed the difficult arts of reducing the ores of copper and of tin, which their country did not produce, of making bronze from them, and of moulding and casting the bronzes, I must come to the conclusion that their bronze swords were of foreign fabrication, introduced in the course of trade. From the small size of the hilts, it may be inferred that they were the work of some Asiatic people, and probably of the same who introduced into Scandinavia the Runic characters. This, no doubt, is but mere conjecture, but on a question so buried in barbarism and antiquity nothing better can be offered.

In the most recent strata of the alluvium of the Swiss pile-buildings, tools and implements of iron have been detected, and these are pronounced as evidence of an advanced step in civilisation, bringing us, in fact, down to the Roman epoch. With such relics, however, I am satisfied that Romans had nothing to do; that is, that they long preceded the Roman conquest of Gaul, or, in other words, that they were not of Roman, but of Gallic origin, showing that the Gauls had invented iron before they knew the Romans. This is, in my view, satisfactorily proved by the fact that the Gauls, the Cimbri, and the Teutoni all fought with iron weapons, without any mention of bronze being used for this purpose. That the Gauls who, six hundred years B.C., defeated Roman armies and captured Rome, were a people before unknown to the Romans, is certain from the description given of them by the Roman historians. Thus Livy describes them as "a strange and unknown enemy from the ocean and the utmost borders of the earth." This was said of the Celts; but even when, five hundred years later, Italy was again invaded by barbarians, the invaders, the Cimbri and Teutones, are described as a still more remote people. "As for these people," says Plutarch, "who hovered like a cloud over Gaul and Italy, it was not known who they were or from whence they came, on account of the little intercourse they had with the rest of the world, and the length of the way they had marched. It was conjectured, however, from their great stature and the blueness of their eyes, as well as because the

Germans call robbers Cimbri, that they were some of those German nations who dwell by the Northern Sea."

The same writer describes the arms and armour of the Cimbrian cavalry as follows:—"Their breastplates were of polished iron, and their shields were white and glittering. Each man had two-edged darts to fight with at a distance, and when they came to fight hand-to-hand, they used broad and heavy swords." The material of the swords of the barbarians is not here stated, but that is settled by a passage in Polybius, which is as follows:—"The Roman soldiers had remarked in all their former combats that the Gauls were always fierce, impetuous, and very formidable in their first attack, but their swords were such as would make but a single stroke, by the force of which they were so bent and twisted that, unless the soldiers could have leisure to rest them upon the ground, and with the assistance of their feet recover them to their former shape, the sword-stroke was wholly without effect."

The swords, then, of the barbarians who invaded Italy, a hundred and even six hundred years before the birth of Christ, we may conclude were of iron, and as this was soft iron, we infer that steel was unknown to them, which would not be the case had their knowledge been derived from the civilised people of Italy, whether Etruscan or Latin. The inference is that malleable iron was a native discovery of the Gauls, or Germans, or both, and there is no good ground for not believing that a people who had domesticated the larger useful animals, cultivated corn, organised great armies and invaded remote regions, should not have fallen upon the simple process by which ores of iron are reduced to the state of malleable metal. If this was so, the iron found in the diluvium of the Swiss pile-villages was the produce of some Gallic or German nation more advanced than the rude builders themselves, while the bronze relics would, as already stated, be of foreign importation. The frequency of bronze and the infrequency of iron relics, and the latter being found only in the last or most recent stratum of the alluvium is, I think, reasonably accounted for by the far more perishable nature of iron.

I may here remark that the iron of Spain is described by the ancients as of very superior quality to that of Gaul. The Iberian swords were well tempered, showing that the ancient Spaniards, unlike the Gauls, had discovered the art of making steel. The reputation of Spanish iron continued, indeed, down to at least the middle of the last century, for at this last period it was imported into England, ranking in our price currents not only above English, but even above Swedish iron. The discovery of Iberian steel was probably an accident, but the general superiority of the iron was most probably owing to the better quality of the ore.